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Re: **U.S. Patent Application No. 09/916,028**
**Attorney Docket No. 295620-214-063**
**Bridgestone/Firestone, Inc.**



**Message:** **FURTHER TO OUR TELEPHONE CONVERSATION TODAY, ATTACHED ARE THE CLAIMS 1-141 THAT WERE ORIGINALLY FILED IN USSN 09/916,028.**

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**CLAIMS:**

1. A system for measuring a parameter of a device at a first location comprising:

a sensor for measuring the device parameter and generating a data signal representing the measured parameter;

a microprocessor coupled to the sensor for activating the sensor on a first periodic basis to measure the device parameter;

a memory in the microprocessor for storing the generated data signal representing the measured parameter;

a transmitter coupled to the microprocessor; and

a receiver coupled to the microprocessor, the microprocessor periodically partially awakening to determine, on a second periodic basis, if a received transmission is a valid interrogation signal and, if so, fully awakening and responding to the valid interrogation signal, via the transmitter, by at least transmitting the last stored measured parameter.

2. The system of claim 1, wherein the device is a tire tag disposed inside of a vehicle tire, the system further comprising:

a printed circuit board (PCB) disposed within the vehicle tire, the PCB including first antenna terminals, the sensor, the microprocessor, the memory, and the transmitter;

an antenna displaced from the PCB and including second antenna terminals, the first and second antenna terminals being configured to electrically connect with each other to thereby electrically connect the antenna to the transmitter; and

potting material for encapsulating the PCB, the sensor, the microprocessor, the memory, the transmitter, and the antenna.

3. The system of claim 2, wherein the antenna is a monopole antenna.

4. The system of claim 2, wherein the antenna is a dipole antenna.

5. The system of claim 2, wherein the antenna is attached to the PCB such that the antenna is in a plane parallel to and slightly spaced from the plane of the printed circuit board.

6. The system of claim 2, wherein the antenna is integral with the PCB.

7. The system of claim 2, wherein the antenna is attached to the PCB such that the antenna is in a plane normal to the plane of the printed circuit board.

8. The system of claim 2, wherein the antenna is spaced from the PCB.

9. The system of claim 2, wherein the tire tag further includes:

a tire patch for attaching the tire tag to an inside wall of the vehicle tire, the tire patch having a base for adhering to the inside wall of the vehicle tire, anda mesa extending above the tire patch base; the tire patch mesa being constructed to securely attach the tire tag to the tire patch and to assist in isolating the tire tag from tire stresses and vibration.

10. The system of claim 9, further comprising:

a potting material encapsulating the tire tag, the potting material having a periphery;

a leg extending inwardly around the periphery of the potting material and forming a recess; and

a shoulder extending outwardly from a periphery of the tire patch mesa and being received in the recess of the potting material, the shoulder including a generally horizontal lip for abutting the leg of the potting material to securely attach the encapsulated tire tag to the tire patch.

11. The system of claim 10, further comprising:

an arcuate concave recess below the tire patch shoulder, the arcuate concave recess enabling air to be removed from under the tire patch when affixing the tire patch to the tire.

12. The system of claim 2, further comprising:

an orifice in the potting material to enable air inside the tire to reach the pressure sensor; and

a hydrophobic filter associated with the orifice to prevent fluid from reaching the pressure sensor.

13. The system of claim 1, wherein the operating frequency for the system is in the ISM frequency band.

14. The system of claim 1, further comprising a reader/transceiver (RT) at the second location for receiving sensor data from the device and transmitting command signals to the device, the RT including a memory for storing the received sensor data.

15. The system of claim 14, wherein the RT is a portable reader.

16. The system of claim 14, wherein the RT is a fixed gate reader.

17. The system of claim 14, wherein the RT is surveillance reader.

18. The system of claim 14, wherein the RT is an on-board vehicle reader.

19. The system of claim 14, wherein the device is mounted within a vehicle tire and measures parameters including pressure and temperature.

20. The system of claim 1, wherein the device is a tire tag that includes:

a deep sleep mode in which no clock is running but an internal R/C oscillator is incrementing a deep sleep counter which provides periodic wake-up signals at predetermined intervals;

a lucid sleep mode wherein the microprocessor partially awakens, initiates a low-speed clock, and determines if it is time to enter a search mode;

a search mode that continues using the low-speed clock, reads data from the sensor, if it is time for such a reading, and examines the received transmission to determine whether the transmission is a possible interrogation signal; and

an interrogation mode that is entered when the received transmission is a possible interrogation signal, and that initiates a high-speed clock, examines the interrogation signal to see if it is valid, and responds to the valid interrogation signal.

21. The system of claim 20, wherein the microprocessor, in the search mode, determines if it is time to read sensor data by examining a sensor counter.

22. The system of claim 20, wherein the microprocessor, in the search mode, determines if it is time to perform an autonomous transmission (AT).

23. The system of claim 22, wherein the microprocessor, in the interrogation mode, determines whether the interrogation signal is valid by examining a portion of the interrogation signal and, if the portion of the interrogation signal appears to be a valid interrogation signal, reads the rest of the interrogation signal to verify that the interrogation signal is valid, and then responds thereto.

24. The system of claim 1, wherein the microprocessor on a third periodic basis autonomously transmits an alarm signal to at least one remote reader/transceiver (RT) at the second location only when the last stored measured parameter falls outside of a predetermined threshold.

25. The system of claim 1, wherein the device is a tire tag disposed inside of a vehicle tire, the system further comprising:

a reader/transceiver (RT) remote from the tire tag, the RT transmitting forward link packets to the tag receiver; and

a reader processor (RP) remote from the tire tag, the RP receiving return link packets from the RT and identifying the transmitting tire tag from data in the return link packets.

26. The system of claim 25, wherein the RT is capable of interrogating the tire tag to obtain data including at least temperature and pressure.

27. The system of claim 25, wherein the RT is capable of interrogating the tire tag to obtain data including number of vehicle tire rotations.

28. The system of claim 25, wherein the RP identifies the transmitting tire tag on the basis of a functional identification number that is transmitted by the tire tag.

29. The system of claim 25, wherein the RP identifies the transmitting tire tag on the basis of a unique tire tag serial number that is transmitted by the tire tag.

30. The system of claim 25, wherein the RP identifies the transmitting tire tag using a successive approximation routine (SAR).

31. The system of claim 30, wherein the SAR includes comparing a masked comparator value having a certain number of bits to the serial number of the tag.

32. The system of claim 31, wherein the SAR further includes sequentially incrementing a mask value by one to reveal another bit of the masked comparator value.

33. The system of claim 32, wherein the SAR further includes comparing the modified masked comparator value with the serial number of the tag until there is a match.

34. The system of claim 25, wherein the tire tag transmitter and the RT operate in the ISM frequency band.

35. The system of claim 1, wherein the device is a tire tag, the system further comprising:

a remote reader/transceiver (RT) at the second location for receiving data signals from the tire tag transmitter and transmitting command signals to the tire tag receiver; and

a frequency hopping circuit for causing the RT to transmit each command signal on a frequency different from the previous command signal to avoid interference with other devices operating in the same bandwidth.

36. The system of claim 1, further including a remote computer at a third location for receiving data from the second location via a communication channel.

37. The system of claim 36, wherein the communication channel is selected from the group consisting of a wire link, wireless link, RF link, cable link, microwave link, satellite link, optical link, LAN link, Internet link, and Ethernet link.

38. The system of claim 1, further including a tire patch mounted on the inside of a vehicle tire, wherein the tire tag is encapsulated in an epoxy and attached to tire patch.

39. The system of claim 38, wherein the tire patch is disposed on a sidewall of the vehicle tire.

40. A system for measuring a tire parameter comprising:

a tire tag disposed inside of a vehicle tire, the tire tag including:

a sensor for measuring one or more tire parameters;

a microprocessor coupled to the sensor for activating the sensor on a first periodic basis;

a memory in the microprocessor for storing the one or more tire parameters;

a transmitter coupled to the microprocessor; and

a receiver coupled to the microprocessor, the microprocessor periodically partially awakening to a search mode, determining, on a second periodic basis, if a transmission is likely an interrogation signal and, if so, further awakening to an interrogation mode, determining if the transmission is a valid interrogation signal and, if so, responding to the valid interrogation signal, via the transmitter, by at least transmitting the last stored data signal representing the measured parameter.

41. The system of claim 40, further comprising:

a reader/transmitter (RT) at the remote location for receiving data signals from and transmitting command signals to the tire tag;

a reader processor (RP) for interpreting the data signals; and

a computer for communicating with the RP and enabling a user to access data from the tire tag.

42. The system of claim 41, wherein the computer is a remote computer for storing the tire parameters.

43. The system of claim 41, wherein the computer is a field support computer that enables a user to interact with the RT and the RP.

44. The system of claim 41, wherein the RP and the RT are both at the remote location.

45. The system of claim 41, wherein the RP and the RT are at different remote locations.

46. The system of claim 41, wherein the RT is an on-board vehicle reader.

47. The system of claim 41, wherein a RT is provided on each side of a vehicle, each RT unit communicating with one or more tire tags on the same side of the vehicle on which the RT unit is located.

48. The system of claim 41, wherein the RT is a surveillance reader.

49. The system of claim 48, wherein the surveillance reader primarily listens for transmissions from the tire tag.

50. The system of claim 41, wherein the RT is a portable reader.

51. The system of claim 41, wherein the RT is a fixed gate reader.

52. The system of claim 51, further comprising:

a database remote from the fixed gate reader; and

a data transmission device associated with the fixed gate reader for transmitting the most recently stored tire parameters to the database.

53. The system of claim 41, wherein the tire tag is a self-powered unit.

54. The system of claim 41, wherein the RT interrogates the tire tag for the most recently stored tire parameters.

55. The system of claim 41, wherein the reader processor identifies the transmitting tire tag using a successive approximation routine (SAR).

56. The system of claim 55, wherein the SAR includes identifying a tire tag by a serial number.

57. The system of claim 56, wherein the SAR uses a command and response algorithm that compares a masked comparator value having a certain number of bits to the serial number of the tag.

58. The system of claim 57, wherein the SAR further includes sequentially incrementing a mask value by one to reveal another bit of the masked comparator value until the masked comparator value equals the serial number of the tag.

59. The system of claim 41, further comprising a communication link between the RT and the computer that allows a user to upload tag data stored in the RT to the computer.

60. The system of claim 59, wherein the communication link is selected from the group consisting of a wire link, wireless link, RF link, cable link, microwave link, satellite link, optical link, LAN link, Internet link, Ethernet link, and an RS-232 serial link.

61. The system of claim 41, wherein the computer is a personal computer (PC) running appropriate software to maintain a database of tag data.

62. The system of claim 61, wherein the database includes an archive of tag history data.

63. The system of claim 41, wherein the RT transmits a command to the tire tag and then waits a predetermined period of time for a response.

64. The system of claim 41, wherein:

the RT includes a plurality of forward link channels on which to send command signals to the RT;

the tag transmitter includes a plurality of return link channels on which to transmit data signals to the RT; and

the tag uses each return link channel sequentially to respond to each command signal from the RT.

65. The system of claim 64, wherein:

the forward link channels use amplitude shift key (ASK) modulation; and

the return link channels uses frequency shift key (FSK) modulation.

66. The system of claim 64, wherein:

the data rate of the command signals is about 7.5 Kbps; and

the data rate of the data signals is about 60 Kbps.

67. The system of claim 41, wherein the RT transmits a command signal to the tire tag assigning a temporary ID number to the tire tag.

68. The system of claim 41, wherein the tire tag includes an autonomous transmission mode that, at preset intervals, causes the tire tag to awaken and transmit the last stored sensor measurements to the RT, and then returns to a deep sleep mode, all without external activation.

69. The system of claim 41, wherein the tire tag includes an alarm function that, at preset intervals, awakens the tire tag, examines the last stored tire parameters, determines if an alarm condition exists, and, if an alarm condition exists, transmits an alarm signal to the RT, all without external activation.

70. The system of claim 69, wherein the tire tag terminates the alarm signal transmission upon receipt of an acknowledgement from the RT.

71. The system of claim 69, wherein the tire tag rearms the alarm function when the alarm signal transmission is terminated.

72. The system of claim 69, wherein the alarm condition is determined by comparing the most recently stored tire parameters with stored threshold values.

73. The system of claim 69, wherein the alarm signal is transmitted if one of the tire parameters is outside of the stored threshold values.

74. The system of claim 41, wherein the tire tag further comprises a kill tag function that allows a command from the RT to erase all data stored in the tag memory such that the tire tag will not respond to any external commands.

75. The system of claim 41, wherein the tag further includes a first low power internal oscillator for generating a first clock signal.

76. The system of claim 75, wherein the first low power clock signal is used for incrementing a sleep register for determining when to exit a deep sleep mode.

77. The system of claim 75, wherein the first low power clock signal is used for operating the tag in the search mode.

78. The system of claim 41, wherein the tag further includes a second internal oscillator for generating a second clock signal.

79. The system of claim 78, wherein the second clock signal is used for operating the tag in the interrogation mode.

80. The system of claim 41, wherein the tire tag includes a tire history function that only downloads tire history data not previously downloaded to the RT.

81. The system of claim 41, wherein the tire tag includes a tire history function that downloads all of the tire history data stored in the tire tag to the RT.

82. The system of claim 41, wherein:

the RT sends command signals to the tire tag instructing the tire tag to transmit the contents of selected memory locations in the tag memory to the RT; and

the RT sends command signals instructing the tire tag to enter a deep sleep mode after the contents of the selected memory locations have been transmitted to the RT.

83. The system of claim 40, wherein the tire tag further comprises an erase function that erases all stored user level data and returns the tire tag to manufacturer level defaults.

84. The system of claim 40, wherein the tire tag includes an autonomous data collection function that, at preset intervals, awakens the tire tag, takes sensor measurements, stores the sensor measurements, and returns to a deep sleep mode, all without any external activation.

85. The system of claim 40, wherein the tire parameters include one or more of tire pressure, tire temperature, a unique serial number, and tire history data including tire pressure and tire temperature data stored over a predetermined period of time.

86. The system of claim 40, wherein the tire tag includes a write function that enables a user to write data into the tire tag memory, including the wheel position of the tire tag, the vehicle number, the threshold tire pressure values, the threshold tire temperature values, user defined data, and calibration coefficients for the sensor.

87. The system of claim 40, wherein the data signals received from the tire tag include tag history data.

88. The system of claim 40, wherein the tire tag includes password protection to prevent unauthorized users from accessing the tire tag.

89. The system of claim 40, wherein the measured tire parameters include one or more of tire pressure and wherein the tire tag further comprises a turn-off function that enables the tag to recognize when the measured tire pressure is within a preselected pressure threshold and, while the pressure is within the preselected threshold, to cease storing and transmitting tag data to conserve power.

90. The system of claim 40, wherein the tire tag memory stores data including one or more of tire type, tire position on a vehicle, vehicle ID, tire ID, and number of tire revolutions.

91. The system of claim 40, further including a spread-spectrum forward link including at least 50 channels.

92. The system of claim 40, wherein the tag includes different modes of operation, including a sleep mode, to conserve power.

93. The system of claim 40, wherein the tag includes different clock speeds for performing different functions to conserve power.

94. The system of claim 40, further including a tire patch mounted on the inside of a vehicle tire, wherein the tire tag is encapsulated in an epoxy and attached to tire patch.

95. The system of claim 94, wherein the tire patch is disposed on a sidewall of the vehicle tire.

96. The system of claim 40, wherein the valid interrogation signal includes a postamble comprised of a stream of logical zeros.

97. The system of claim 40, wherein the valid interrogation signal includes a postamble beginning with a stream of logical zeros and ending with a logical one.

98. The system of claim 97, wherein the transition from logical zero to logical one signifies the end of the valid interrogation signal.

99. The system of claim 97, wherein the postamble increases the amount of time between the interrogation signal and a response from the tire tag, allowing the tire tag enough time to stabilize its transmitter on an appropriate return link channel.

100. A tire tag comprising:

a sensor for measuring at least one tire parameter;

a microprocessor for causing the tire tag to enter a deep sleep mode in which a minimum number of electrical components are powered to conserve battery power;

the microprocessor, on a periodic basis, enabling only the electrical components necessary to enter a lucid sleep mode, initiate a low-speed clock, and determine if it is time to enter a search mode;

a receiver coupled to the microprocessor;

the microprocessor, on a periodic basis, enabling only the electrical components necessary to enter a search mode, use the low-speed clock, read data from the sensor, if it is time for such a reading, determine if a transmission received by the receiver is likely an interrogation signal from a reader/transceiver (RT) and, if so, enable all of the necessary electrical components required to enter an interrogation mode and initiate a high-speed clock.

101. The system of claim 100, wherein the microprocessor, in the search mode, determines if it is time to perform an autonomous transmission (AT).

102. The system of claim 100, wherein the microprocessor, in the interrogation mode, determines whether the transmission is a valid interrogation signal and, if so, responds thereto.

103. The system of claim 102, wherein the microprocessor determines whether the transmission is a valid interrogation signal by examining a portion of the transmission and, if the portion of the transmission appears to be a valid interrogation signal, reading the rest of the transmission to verify that the transmission is a valid interrogation signal.

104. The system of claim 103, wherein the microprocessor responds to the valid interrogation signal by transmitting the last stored sensor data.

105. The system of claim 100, wherein the tire tag remains in the search mode looking for likely interrogation signals for a first predetermined period of time and then returns to the deep sleep mode for a second predetermined period of time.

106. The system of claim 100, wherein the microprocessor includes two internal oscillators for producing the low-speed clock for operating the tire tag in the lucid sleep mode and the search mode, and the high-speed clock for operating the tire tag in the interrogation mode.

107. A system for measuring a parameter of a device comprising:

a sensor for measuring the device parameter and generating a data signal representing the measured parameter;

a memory in the microprocessor for storing the generated data signal representing the measured parameter;

a microprocessor coupled to the sensor for activating the sensor on a first periodic basis to measure the device parameter, the microprocessor comparing the measured parameter with one or more parameter thresholds and generating an alarm signal if the measured parameter is outside of the one or more parameter thresholds; and

a transmitter coupled to the microprocessor for transmitting the alarm signal on a second periodic basis to a remote reader/transceiver (RT) without external activation.

108. The system of claim 107, wherein the microprocessor partially awakens, takes (on the first periodic basis) sensor measurements, stores the sensor measurements, checks for alarm conditions, and returns to a deep sleep mode, all without any external activation.

109. The system of claim 107, wherein the device is a tire tag disposed inside of a vehicle tire, and further comprising:

a printed circuit board (PCB) disposed within the vehicle tire, the PCB including first antenna terminals, the sensor, the microprocessor, the memory, and the transmitter;

an antenna disposed in the vehicle tire and including second antenna terminals, the first and second antenna terminals being configured to electrically connect with each other to thereby electrically connect the antenna to the transmitter, the antenna being spaced from the PCB; and

potting material for encapsulating the PCB, the sensor, the microprocessor, the memory, the transmitter, and the antenna.

110. An electronic tire management system comprising:

a tire tag mounted in a tire and including:

a sensor for measuring one or more tire parameters;

a transmitter for transmitting data signals using frequency shift key (FSK) modulation, the data signals representing the measured tire parameters; and

a microprocessor, coupled to the sensor and the transmitter, for activating the sensor at a first periodic interval; and

a remotely located reader/transceiver (RT) for sending interrogation signals to the tire tag and receiving data signals from the tire tag, the RT transmitting the interrogation signals using amplitude shift key (ASK) modulation.

111. The system of claim 110, wherein the microprocessor activates the tag transmitter on a second periodic interval and sends data signals representing the measured tire parameters to a reader selected from the group consisting of a surveillance reader, a fixed gate reader, an on-board vehicle reader, and a portable reader.

112. The system of claim 110, wherein:

the ASK interrogation signals are transmitted to the tire tag at a first rate in Kbps; and

the FSK data signals are transmitted from the tire tag to the RT at a second rate higher than the first rate in Kbps.

113. The system of claim 112 wherein:

the first rate is about 7.5 Kbps; and

the second rate is about 60 Kbps.

114. A method for electronically monitoring tire parameters with a tire tag, the method comprising:

causing the tire tag to enter a deep sleep mode to conserve power; and

automatically and periodically awakening the tire tag to a search mode, measuring and storing the tire parameters on a first periodic basis, performing pre-discrimination on a second periodic basis to determine whether a transmission is likely a forward link packet from a remote reader/transceiver (RT) and, if not, returning to the deep sleep mode.

115. The method of claim 114, further including:

awakening to a lucid sleep mode to turn on a low-speed clock and sample a search mode counter; and

awakening to a search mode if the search mode counter equals zero.

116. The method of claim 114, further including:

automatically awakening the tire tag to an interrogation mode to determine whether the transmission is a valid forward link packet and, if so, responding to the valid forward link packet; and

returning the tire tag to the deep sleep mode when the interrogation mode is complete.

117. The method of claim 114, further including:

attaching the tire tag to a tire patch;

attaching the tire patch to an inner wall of a tire having opposing beads and a tire tread, the tire having first metal wires associated with at least one of the tire beads; and

positioning the tire patch on the inner tire wall sufficiently far from at least one of the beads and the tire tread to optimize tire tag transmission of RF signals through the tire and the amount of stress transferred to the tire tag from the tire.

118. The method of claim 117, further including positioning the tire patch about half way from at least one of the beads to the beginning of the tread.

119. The method of claim 117, wherein the first metal wires are circumferentially disposed in at least one of the tire beads.

120. The method of claim 119, wherein second metal wires are disposed in the tire that radially extend from one of the tire beads on one side of the tire to a second of the beads on an opposing side of the tire, and wherein the spacing of the second metal wires is greater at the center of the tire tread than at the tire bead.

121. The method of claim 120, further including positioning the tire patch on the inner tire wall so as to optimize tire tag transmission of RF signals through the first and second metal wires.

122. A tire tag comprising:

a microprocessor programmed to:

store the cold-fill temperature of a vehicle tire;

measure the hot-inflation pressure and temperature of the vehicle tire during operation of the tire;

calculate an equivalent cold pressure of the tire using the ideal gas equation:

PV = nRTwhere,

P = pressure exerted by the gas in the tire (a variable);

V= volume of the chamber containing the gas (essentially a constant);

n = number of moles of gas contained within the tire (a constant);

R = a constant specific to the gas contained within the tire;

T = temperature of the gas contained within the tire (a variable); and

T1/P1 = T2/P2where

P1 = pressure at time t1 (cold-fill reference pressure)

P2 = pressure at time t2 (current hot pressure)

T1 = temperature at time t1 (cold-fill reference temperature)

T2 = temperature at time t2 (current hot temperature); and

compare the calculated equivalent cold pressure with a stored Target Cold-fill Inflation Pressure specified by the manufacturer of the tire to determine if the tire is properly inflated during operation.

123. A tire tag comprising:

a microprocessor programmed to:

measure the current hot pressure (P2) and the current hot temperature (T2); and

determine an equivalent cold pressure of a tire using P2 and T2.

124. The tire tag of claim 123, wherein the microprocessor is programmed to use the combined gas laws of Boyle and Charles to calculate the equivalent cold pressure of the tire from P2 and T2.

125. The tire tag of claim 123, wherein the microprocessor is programmed to use altitude pressure data to calculate a cold tire pressure based upon the elevation of the area where the tire tag is used.

126. The tire tag of claim 123, wherein the tire contains a liquid and the microprocessor is programmed to correct P2 to account for vapor pressure in the tire.

127. The tire tag of claim 126, wherein the microprocessor is programmed to determine the partial pressure of the liquid, and to subtract the partial pressure from P2.

128. The tire tag of claim 126, wherein the liquid is water.

129. The tire tag of claim 126, wherein the liquid is a commercial grade fluid.

130. An interrogator comprising:

a microprocessor programmed to:

receive the current hot pressure (P2) and the current hot temperature (T2) readings from a tag; and

determine an equivalent cold pressure of a tire using P2 and T2.

131. The interrogator of claim 130, wherein the microprocessor is programmed to use the combined gas laws of Boyle and Charles to calculate the equivalent cold pressure of the tire from P2 and T2.

132. The interrogator of claim 130, wherein the microprocessor is programmed to use altitude pressure data to calculate a cold tire pressure based upon the elevation of the area where the tire tag is used.

133. The interrogator of claim 130, wherein the tire contains a liquid and the microprocessor is programmed to correct P2 to account for vapor pressure in the tire.

134. The interrogator of claim 133, wherein the microprocessor is programmed to determine the partial pressure of the liquid, and to subtract the partial pressure from P2.

135. The interrogator of claim 133, wherein the liquid is water.

136. The interrogator of claim 133, wherein the liquid is a commercial grade fluid.

137. A system for measuring at least one tire parameter comprising:

a tire tag disposed in a vehicle tire;

a sensor forming a part of the tire tag and measuring at least one tire parameter on a first periodic basis;

a memory in the microprocessor for storing the at least one measured tire parameter;

a microprocessor in the tire tag for causing communication between the tire tag and a remote source;

a transmitter/receiver forming a part of the tire tag for communicating with the remote source and transmitting at least the last stored tire parameter to the remote source under control of the microprocessor;

the microprocessor causing the sensor to measure the at least one tire parameter independently of causing the transmitter/receiver to communication with the remote source; and

the microprocessor periodically partially awakening to determine, on a second periodic basis, if a received transmission is a valid interrogation signal and, if so, fully awakening and responding to the valid interrogation signal.

138. A system for measuring a vehicle parameter comprising:

a sensor for measuring the vehicle parameter and generating a data signal representing the measured parameter;

a microprocessor coupled to the sensor for activating the sensor on a first periodic basis to measure the vehicle parameter;

a memory in the microprocessor for storing the generated data signal representing the measured parameter;

a transmitter coupled to the microprocessor; and

a receiver coupled to the microprocessor, the microprocessor periodically partially awakening to determine, on a second periodic basis, if a received transmission is a possible interrogation signal and, if so, fully awakening the tire tag to an interrogation mode to determine if the interrogation signal is valid, and, if so, responding to the valid interrogation signal, via the transmitter, by at least transmitting the last stored measured parameter.

139. The system of claim 138, wherein the sensor, microprocessor, memory, transmitter, and receiver are housed in a tag disposed on a vehicle, the tag communicating with a remote device via a wireless protocol.

140. The system of claim 139, wherein the microprocessor determines if the interrogation signal is intended for this particular tag.

141. The system of claim 138, wherein the vehicle parameters include vehicle/axle load(s), tire revolutions (mileage), exhaust emissions, oil pressure, battery charge, coolant levels, brake wear, transmission fluid level, power steering fluid level, brake fluid level, clutch fluid level, windshield wiper fluid level, and status of headlights and taillights.